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A
GENERAL and PARTICULAR

ACCOUNT

OF THE

Annular Eclipſe of the Sun,

WHICH WILL HAPPEN
On SUNDAY, *April* 1, 1764, in the FORENOON.

With a GENERAL and PARTICULAR

MAP

OF THE
PASSAGE of the MOON'S SHADE, or PENUMBRA, over the EARTH, from the *Entrance* to the *Exit* of the ſame; and alſo over ENGLAND and the neighbouring Dominions:

EXHIBITING
All the various APPEARANCES of this ECLIPSE in different Parts of the Earth.

LIKEWISE A
REPRESENTATION thereof for ſeveral eminent CITIES and remarkable Places.

The TIMES and CIRCUMSTANCES of this ECLIPSE correctly computed from Tables in the ROYAL ASTRONOMER, improving all other Accounts, computed from TABLES of *leſs Authority.*

Humbly inſcribed to the ROYAL SOCIETY.

And God ſaid, Let there be LIGHTS *in the Firmament of Heaven, to divide the* DAY *from the* NIGHT; *and let them be for* SIGNS *and for* SEASONS, *and for* DAYS *and for* YEARS.
Gen. i. 14.

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MDCCLXIV.
[Price Two Shillings and Sixpence.]

OF THE
Annular ECLIPSE of the SUN,
On SUNDAY, APRIL 1, 1764.

What an Eclipſe *of the* Sun *is.*

THE *Appearance*, called an *Eclipſe of the Sun*, might properly be called an *Eclipſe of the Earth*; the Earth and its Inhabitants at that Time being *only* deprived of the Sun's Light, (by the *Interpoſition of the Moon's dark Body between the Sun and our Sight, caſting her* totally *dark* and alſo partial *Shadow over thoſe Parts of the Earth, and involving it's Inhabitants therein, where the Sun is ſeen* more *or* leſs *eclipſed)* while the Sun himſelf ſuffers no *Defect* of Light ——— An Eclipſe of the Sun can only happen at *New Moon*.

If we conſider a *Spectator* placed at the Moon, in the Time of what is called an Eclipſe of the Sun, he will behold the Moon's totally *dark Shadow*, and her *Penumbra*, paſs over the Earth's Diſk or Face, like an Inhabitant of the Earth ſeeing her *Penumbra*, or partial Shadow paſs over the Moon's Diſk in an *Eclipſe of the Moon*, which can only happen at *Full Moon*, when the Earth is interpoſed between the Sun and the Moon.

Here it is to be obſerved, that the *Sun* is ſeen eclipſed, whether the *Moon*'s total Shadow, and its adjacent *Penumbra*, or the *Penumbra*, (beyond the Termination of the total Shadow,) and its adjacent *fainter* Shade, fall upon the *Earth*; and is ſeen more or leſs eclipſed, according to the greater or leſs Diſtance of the Obſerver from the *Path*, the total *Shadow*, or its oppoſite *Penumbra*, takes over the enlightened *Diſk*, or Face of the Earth. Whereas whenever the *Moon* is ſeen eclipſed, the *Penumbra*, or *partial* Shadow, only, of the Earth, falls upon her. For the Rays of the *Sun* that paſs through the Earth's Atmoſphere falling into it, and enlightening it, the Earth's total *Shadow* becomes a *Penumbra*, or Shade only; making the Moon in a *lunar Eclipſe* to become viſible; but for which Cauſe could not be ſeen. While the Earth diurnally revolves about its *Axis*, a *Spectator at the Moon* will ſee the *Cities*, *Countries*, and *Towns* move upon the Earth's *Diſk*, or Surface, from *Weſt* to *Eaſt*, or from *Right* to *Left*. As ſuch *Spectator* at the *Moon*, at the Time of a *Sun's Eclipſe*, ſees only the Earth's enlightened Hemiſphere, he will ſee *Places* emerge from behind the *weſtern Edge* of the *Earth's Diſk*, and move eaſtward, when the Inhabitants of ſuch *Places* of the Earth ſee the *Sun riſe*, and move towards the *Weſt*. And, when ſuch *Spectator*, in the Moon, ſees the Edge of her *Penumbra* touch any Place upon the Earth's Diſk, the Inhabitants of that Place on the Earth will ſee the *Sun begin to be eclipſed*. (See *Royal Aſtronomer and Navigator*, p. 398.)

Two Kinds *of* Solar Eclipſes.

Hence, there are two Kinds of *Eclipſes* of the *Sun*; *total* and *annular*. The firſt Kind having the Properties above deſcribed, is further illuſtrated by the *Figure* of the Moon's *totally* dark Shadow falling upon the Earth, in the Eclipſe-Map prefixed to this Account. Another Figure repreſents the Moon's *Antiumbral* and penumbral Cone, falling upon the Earth, and its Paſſage over the ſame, in the enſuing *annular* Eclipſe. This annular Eclipſe of the Sun would appear, to a *Spectator* at the Moon, ſimilar to the *total* Eclipſe of the Sun above deſcribed;

deſcribed; *except* that the Moon's *inverted penumbral* Cone, and its adjacent *Shade*, inſtead of her *dark Shadow*, and its connected *Penumbra*, in a *total* Eclipſe, will be attended with leſs Obſcurity to the Inhabitants of the Earth; becauſe, in this Caſe, the Sun is no-where *totally* hid from the Sight.

A *total Eclipſe of the Sun* happens at a *New Moon*, when the Moon is ſo near the Earth, that her *dark Shadow* (limited by *Lines* drawn from the Sun's to the Moon's Extremes, on the ſame Sides, terminating under a certain Angle to be determined) falls on the Earth's Surface; ſo that the Inhabitants of thoſe Places over which it paſſes, are, for ſome Time, wholly deprived of the Sun's Light. The apparent Diameter of the Moon, at the Middle of ſuch an Eclipſe, being greater than the apparent Diameter of the Sun, his Diſk, or Body, is ſeen wholly covered by the Moon. A Repreſentation of this dark *Shadow*, and its *Penumbra*, is ſhewn by the *Figure* in the Left-hand Margin of the Eclipſe-Map. ——— The lighter Parts, or *Penumbra*, in that Figure, terminated by Lines drawn from the Sun's contrary Parts to the contrary Parts of the Moon, mark the Extent of this *Solar Eclipſe*, through every Digit of the Sun's Body ſeen eclipſed, from the Earth's Surface. And the Motion of the *dark conical Shadow*, connected with the faint conical Shade, or *Penumbra*, paſſing over the Earth, it's *Courſe*, *Velocity*, *oval Form*, and *Dimenſions*, from the *Entrance* to the *Exit* thereof, deſcribe the *Extent* and *Limits* of this Kind of *Eclipſe*, on the different Countries over which they paſs.

An *annular Eclipſe of the Sun* happens at a *New Moon*, when the Moon is ſo far diſtant from the Earth, that her conical *dark Shadow* ends in a *Point*, at ſome Diſtance from the *Earth*, without reaching it's Surface; and therefore, in this Caſe, no Part of the Earth can be covered by the Moon's totally *dark Shadow*, or *Umbra*, nor can the Sun ſuffer a total Eclipſe. But the Sun's Rays croſſing each other in this Point where the Moon's dark Shadow terminates, at a diſtance from the Earth, diverge from thence under a certain Angle, (which may be determined,) and form, between thoſe croſſing Rays, an inverted *penumbral Cone*, lighter than the Moon's *dark Shadow*, formed on the contrary Side of the ſame terminating Point, to both the *umbral* and *antiumbral* Cone. This *antiumbral* and *penumbral* Cone, thus proceeding under the ſaid Angle, falls upon the Earth's Surface, and (the Moon's apparent Diameter at this Time being leſs than the Sun's) will occaſion the Appearance of what is called an *annular Eclipſe of the Sun*, in all Places on the Earth where this Shade deſcends; *that is*, the Moon will be there ſeen wholly included in the Sun's *Diſk*, within an equal or unequal Ring, or *Annulus*, of Light, (whence the Name of *annular Eclipſe*) compoſed of the Sun's Edge, encircling her whole Body, except in the Point where the Sun's Edge juſt touches that of the Moon. But to thoſe Inhabitants who live in the Middle of the Paſſage of the Moon's *antiumbral* and *penumbral* Cone, over the Earth's Surface, this Eclipſe of the Sun will appear *central* and *annular*, with an *equal Ring* of the Sun's Edge ſeen encompaſſing the Moon's whole dark Body.

The fainter Shade, or adjacent *Penumbra*, terminated, on each Side the conical *Shade*, by *Lines* drawn from the contrary Extremes of the Sun's to the contrary Extremes of the Moon's dark Body, (in the Right-hand *Figure* in the Margin of the *Eclipſe Map*) ſhews the Extent of this Kind of ſolar Eclipſe, through the ſeveral Digits he is ſeen eclipſed from the Earth's Surface ——— The *antiumbral* and *penumbral* inverted Cone, before deſcribed, connected with this fainter Shade, or adjacent *Penumbra*, moving together over the Earth's Surface, the *Courſe*, *Velocity*, *oval Figure*, and *Dimenſions*, from the *Entrance* to the *Exit* thereof, mark the *Extent* and *Limits* of *this Kind of Eclipſe*, on the different Parts of the Earth over which they paſs.

The *Shade* in the general *Eclipſe Map* ſhews the *Paſſage* of the Moon's *antiumbral* and *penumbral* Cone over the Earth's Surface, from it's *Entrance* to its *Exit*; in which *Track*, or *Limits*, the Sun is ſeen, by the Inhabitants thereof, to be annular, or both annular and central eclipſed.

The

The *Digit-lines*, on each Side the *annular Shade*, ſhew the Parts of the Earth over which they paſs; where the Sun is ſeen as many *Digits* (or *Parts of* 12) eclipſed as are marked in the *Map*.

The *dotted Hour-lines* ſhew the *Times* and Quantity of this Eclipſe, happening on all Parts of the Earth where they paſs, which interſect the *Lines of Quantity eclipſed*. The Times of *Beginning*, *Middle*, and *End* of Eclipſe, at Sun-riſing and Setting are all according to the Tables in the *Royal Aſtronomer and Navigator*.

The full *Hour-lines* ſhew the Times and Quantity of this Eclipſe happening, in the ſame Reſpect, according to Dr. *Halley*'s *Tables*, *(uncorrected)* with which, and other Tables, thoſe in the *Royal Aſtronomer* are ventured to be compared; that Obſervation of the enſuing ſolar Eclipſe may determine which are the moſt uſeful and correct.

The *Latitudes* in the Map are numbered from the *Equinoctial* to the *Pole*, in equal Diviſions: As the Longitudes are alſo numbered, in equal Diviſions, from *Ferro* Iſle. Theſe are both according to the *French* or *Italian* Manner of *conſtructing* an *Eclipſe* of the Earth; to which *Method* we have conformed, as appearing to be manifeſtly the beſt Method of any other; marking, by its Motion, the Track of the Moon's *Shade*.

The *oval Shade* in the particular *Eclipſe Map* ſhews the *Section*, or *Baſe*, of the Moon's *penumbral Cone* at the Earth's Surface, in its Paſſage over *England* and the neighbouring Dominions; comprehending the Extent of the *annular* Appearance of this *ſolar Eclipſe*, where the Sun is ſeen moſt obſcured.

The *middle Line*, marked by this *oval* Shade, ſhews the Places in *England* and Parts adjacent, where the *Annulus*, or Sun's Ring, round the Moon's dark Body, will be ſeen of *equal Breadth*; *that is*, where the Eclipſe will be ſeen central and *annular*. And the two Out-Lines, marked by the Paſſage of the *oval Shade*, ſhew thoſe Parts of *England* and the neighbouring Places where the Sun's Edge will appear on oppoſite Sides, to be juſt touched by the *Edge* of the Moon's dark Body, and where it will be ſeen upon the Sun.

In every other Place of this *ſhaded Track* the Moon will appear ſurrounded with a Ring of Light, compoſed of the Sun's Edges, of *unequal Breadth*, and different Poſition.

The Inhabitants of *England* and Parts adjacent, living without the *Limits* of the ſaid *Track* of the Moon's Shade, will ſee the *Sun* only *partially* eclipſed, according to their Diſtance from the *Out-lines*, on each Side of that Track, as marked in the Map. Where the *Appearances* for ſeveral Places are ſhewn by their ſeveral *Types*.

The Times and other *Circumſtances* of this Eclipſe, for different *Places*, are as follow.

A General COMPUTATION *of the enſuing* SOLAR ECLIPSE, *on April* 1, 1764.

From the TABLES *in the* ROYAL ASTRONOMER.

Circumſtances of happening according to apparent TIME.	d	h	m	s	*Circumſtances according to* DEGREES.	°	′	″
Time of Ecliptic Conjunct. before Noon	April 1	10	23	45	Sun and Moon's Ecliptic Longitude, then	♈ 12	10	4
					Moon's Latitude, then, North		40	21
Middle of the general Eclipſe		10	15	33	Moon's Latitude, then		39	50
					Longitude of the Moon's central Shade at the Middle of the general Eclipſe, West	8	20	0
					In Latitude, then, North	46	0	0
Duration of the Moon's central Shade on the Earth's Diſk, or Time of the Sun's greateſt viſ. Obſcuration by the Moon		2	35	34				
Whole Duration		5	27	0				
Central Shade enters the Earth's Diſk at Sun-riſe		8	58	46	Longitude Weſt of Greenwich	47	58	46
					In Latitude, correſponding, North	19	12	0
——— croſſes the Meridian		11	2	0	Longitude E. of Greenwich	14	30	0
					In Latitude, then, North	63	43	0
——— quits the Earth at Sun-ſetting		11	33	0	Longitude from Greenwich, Eaſt	117	7	0
					In Latitude, correſp. then, North	76	21	0

Circumſtances according to DEGREES. ° ′ ″
Angular Motion of the Path of the Moon's central Shade about the Pole 165 5 0
Reciprocal Velocities of the Moon's Central Shade, and the Earth on it's Axis, As 4,65 to 1.

Hence the General APPEARANCES *of this* ECLIPSE, *according to apparent* TIME, *and to* DEGREES.

	h m	Lat.	Long. fr. *Greenwich*.
Begins at Sun-riſe	7 32	0 59 S	22 30 W.
Sun riſes centrally eclipſed	8 59	19 12 N	47 58.
Middle of Eclipſe	10 15½	46 0	8 20
Cent. Shade on Merid.	11 2	63 43	14 30 E.
Sun ſets cent. eclipſ.	11 33	76 21	117 7
Eclipſe ends at Sun-ſet	12 59	57 2	83 30

	° ′ ″		′ ″
Sun's Declin. N.	4 49 10	Moon's horiz. Parallax	53 41
—— Apparent Diam.	32 10	———— Diam.	29 32
—— Hor. Motion	2 28	———— Hor. Motion	29 44

PASSAGE *of the* MOON'S PENUMBRA, *or Central* SHADE, *over and near ſeveral principal* CITIES *and remarkable* PLACES.

Cities and remarkable Places.	*Latitudes* thereof.	*Longitude* from *Greenwich*.	Cent. of ☽'s *Shade* croſſes terreſt. Merid. of the Place *Ap*. 1, 1764.	In the Latitude of	Center of the Moon's Shade's neareſt Approach to the Place.	Time of its neareſt Approach.	Sun's Dig. eclipſed, or Parts of 12, his Diameter.
	° ′	° ′	h m	° ′		h m	° ′
	N	W	bef. Nn.	N	° ′	bef. Nn.	N
Ferro	27 47	17 34	9 3	38 18	5 5	9 12	9 47
Liſbon	38 42	9 7	9 46	43 54	3 1	9 53	10 53
Dublin	53 12	7 1	9 56	45 36	4 8	10 2	10 S7
Edinburgh	55 55	3 0	10 16	49 7	3 53	10 22	10 5
St. *Maloe's*	48 39	2 2	10 23	49 43	0 38	*annular*	N
Durham	54 48	1 45	10 22	50 8	3 17	10 25	10 25
Greenwich Obſ.	51 28½	0 0	10 32	51 21	0 9	Sun's Alt. 39° 53′ Az. fr. Eaſt 60° 54′	

Direction of the Moon's central Shade, with the *Parallel*, 53° 30′; Tranſverſe Diameter of the *penumbral* Shade 3° 5′; Conjugate 2° 22′; Diam. perp. to the *Path* 2° 59′, or 179 geographical *Miles*, (60 in a Degr.) or 207 *Engliſh* Miles.

	° ′	° ′	h m	° ′		h m	° ′
	N	E	bef. Nn.	N	° ′	h m	° ′
Canterbury	51 26	1 10	10 38	52 18	0 42	*Annular*	N
Paris	48 50	2 20	10 44	53 20	2 52	10 41	10 56
Copenhagen	55 41	12 45	11 37	60 54	4 6	11 34	10 8
			Aftern.				
Stockholm	59 21	18 3	12 4	64 10	3 32	12 2	10 25
St. *Peterſburgh*	59 56	30 20	1 7	69 55	9 17	1 3	8 19

N. B. The *Umbra*, or Moon's *conical dark Shadow*, terminates before it reaches the Earth; where her *penumbral* inverted *conical Shadow* begins, ſpreading itſelf wider and wider, and falling on the Earth's Surface, in an *oval* Form, 214 Engliſh *Miles* long, and 164 Engliſh *Miles* broad.

Times and other Circumſtances of this Annular ECLIPSE, *at* Greenwich.

		Apparent Time.		
		h	m	s
Beginning		9	5	54
Immerſion		10	28	38
Middle, or greateſt Obſcuration		10	31	58
Viſible Ecliptic Conjunction		10	32	10
Emerſion		10	35	18
End	Afternoon	12	2	57
Duration of the *annular* Appearance			6	40
Duration of the Eclipſe		2	57	3
Digits eclipſed	11 Dig. 31′			
Scruples of *Incidence*			31	0
——— of Emerſion			1	10
Time of Incidence		1	28	51
——— Repletion		1	34	26
Angle of Direction with Parallel of Latitude	53′ 30″			
Viſ. Lat. of the Moon	8″ South			

Time will diſcover whether the *Tables* in the *Royal Aſtronomer*, or any other *Tables*, are moſt to be depended on for making the like Calculations.

N. B. The Moon's *Parallaxes* in *Halley's* Tables, and alſo thoſe in the *Royal Aſtronomer*, are aſcertained from Obſervations of the total Eclipſe, 1715, and of the *Annular* Eclipſes in 1737 and 1748 (to which the Computations exactly correſpond) and ſo are of greater Authority than her *Parallaxes* aſcertained by *Mayer*, or any other Aſtronomer, from later Obſervations leſs to be depended on. The Moon's Latitude in the *Royal Aſtronomer* is always within a Minute of Truth; but Mr. *Mayer's Aſtronomical Tables* are found ſometimes to err 3 Minutes of a Degree in the Moon's Latitude, as Mr. *Maſkelyne* obſerves in his Treatiſe of Longitude: Which *Defect* Mr. *Mayer*, we are told, has endeavoured to ſupply by 15 *prolix* Equations (inſtead of his two firſt *Equations)* of the Moon's Latitude, in MS. not yet publiſhed, though in ſome Hands. Theſe 15 Equations of the Moon's Latitude ſome, by *Miſtake*, have attributed to Dr. *Bradley*; who never compiled (*'tis ſaid*) any Tables of his own, but uſed *Mayer's* laſt Tables, corrected, and ſometimes the *French* Tables.

In an *annular* Eclipſe a leſs or greater *Parallax* (correſpondent to the Moon's leſs or greater apparent Diameter) will occaſion a *broader* or *narrower Shade*; and a *greater* Latitude of the Moon, N. or S. will fling that *Shade* nearer to, or farther from, a given *Place*, in its Paſſage over the Earth's Surface; and the *contrary Effects* will be produced by the Moon's *Parallax* and Latitude, affecting the total *Shadow*, its *Dimenſions*, and *Paſſage* over the Earth in a *total* Eclipſe of the *Sun*. Which *Effects* of the *Moon's Parallax* and *Latitude* are ſo jointly concerned in producing the Shade, and alſo the dark Shadow, their *Dimenſions*, and Courſe of their *Paſſage* over the Earth, (then at a particular Diſtance and Poſition from the Moon,) that it is ſometimes difficult, when the Moon's true Latitude is not well aſcertained, to determine whether the *Error* lies in the *Parallax*, or *Latitude*, or both, (*and how much*,) when the Obſervation falls different to the *Shade*, or *Shadow*, by Computation.

The *Parallactic* Angle being about 84 *Degrees*, at the Time of this *annular* Eclipſe, the Point, or Center of the Moon, on the *Diſk*, muſt be in an Angle of 6 *Degrees* to the Right of the *vertical* Circle, if her viſible Latitude is *Northward*; but to the Left if Southward.

This will give the Poſition of the Moon's *Cuſps*, or Horns; though, in this *Inſtance*, the Path is almoſt at Right-angles with the *Vertex*.

EXPLANATION.

The Moon's *penumbral* Shade, from its *Entrance* to its *Exit*, paſſes over 160 Degrees of Longitude on the Earth's Surface, in 2h. 36m. of Time, nearly.

The *Latitude* where the *central Shade* croſſes the Meridian at the Middle of the *general Eclipſe* is 46 Degrees.

160 Degrees of Longitude diminiſhed in the *Ratio* of the Radius to the Coſine of that Latitude, gives 111,9°, or 671,4 *geographical* Miles in the given Time; being nearly $42\frac{1}{4}$ geographical Miles, moved over at a Mean, by the Moon's *Shade* in 1 Minute.

The Velocity of which Shade farther diminiſhed as Coſ. of different Inclination of the Moon's Orbit, and different Parallel of Latitude, gives the *Velocity* of the *Moon's Shade*, near the Parallel of *Greenwich*, about 33 geographical Miles in a Minute.

The Center of the *Shade* croſſes the *terreſtrial* Meridian of the Place, in the particular Latitudes expreſſed in the foregoing Table.

The *neareſt Approach*, or leaſt Diſtance of the *central Shade*, to the *Place* againſt which it ſtands, is ſet down in *Degrees* and *Minutes*; with the Time of that neareſt Approach in the next *Column*.

The Earth's *Diſk* being ſeen from the Moon, in this Eclipſe, under an Angle of 53′. 31″, every Minute at the Moon's Orb extends, when projected on the *Diſk*, over 1°. 4′. 14″. and conſequently every Degree on the Earth's Diſk is very nearly equal to 56″. 2‴. at the Moon. Hence,

As 64.25′ at the Earth, to 1′. at the Moon, ſo any other Minutes at the Earth to thoſe at the Moon. *Whereby the Latitude of the Moon will be known on the Sun's Diſk, anſwerable to the Degrees and Minutes of Latitude at the Earth, and the contrary.*

General Passage *of the* Moon's Shade *over the* Earth.

It enters the Globe on the *Atlantic Ocean*, to the Eaſtward of the *Caribbee Iſlands*, and purſuing a North-Eaſterly Courſe, leaves the *Cape de Verd* Iſles to the Southward, and the *Azores* to the Northward; touches at the *Madeiras*; touches on the Coaſt of *Spain* in *Galicia*, near *Corunna*; then croſſing *Bay of Biſcay* paſſes over *Bretagne*, and ſo over the *Channel* into *England*; from thence it croſſes the *German Ocean* into *Norway*, leaving *Bergen* to the Weſt; and then paſſing over or near *Tornea*, on the Northern Coaſt of the *Baltic*, traverſes *Sweedland* and *Lapland* over the *North Cape*; and finally quits the Earth in the *Frozen Ocean*, according to the *ſhaded Track*, in the general *Map* of this Eclipſe of the Earth.

The North-Eaſterly* Passage *of the* Middle, Weſtern, *and* Eaſtern Edge, *of the* Moon's *penumbral* Shade, *over* England, *and Parts adjacent*.

The *Middle* of the Moon's *penumbral Shade* paſſes over *Bretagne* in *France*, from *Blavet* to *St. Maloes*; croſſes the *Engliſh* Channel between the Iſles of *Jerſey* and *Guernſey*, goes near the *Iſle of Wight*, and enters *England* a little to the Eaſtward of *Portſmouth* in *Hampſhire*; then goes near *Petworth* and *Chicheſter* in *Suſſex*, and ſo on near *Guilford*, *Croydon*, and *Kingſton*, in *Surry*; then croſſing the *Thames* a little to the Eaſtward of *London*, leaving that Metropolis to the Left; then traverſes near *Waltham* and *Epping* on the Left; and paſſes near *Chelmsford*, *Dunmow*, and *Braintree*, in *Eſſex*, leaving *Colcheſter* and *Harwich* a little to the Right; then travels near *Sudbury* and *Woodbridge* in *Suffolk*, leaving *Ipſwich* to the Right; paſſing near *Bungay* and *Beccles* in *Suffolk*, to the Left; and quits the Coaſt of *England* at *Leoſtoff*, about 7 Miles from *Yarmouth*, traverſing the *German Ocean* towards *Denmark* and *Norway*.

The Weſtern Edge enters *England* near *Plymouth Sound* in *Devonſhire*, paſſes on near *Taviſtock*, *Exeter*, and *Tiverton*, in the ſame County; then traverſes *Somerſetſhire*, and marches up the *Severn*, over an Iſland called *Stepeholmes*, leaving *Briſtol* to the Right; then travels near *Chepſtow* between *Monmouth* and *Glouceſter*, paſſing near *Worceſter*, in *Worceſterſhire*, and *Coventry* in *Warwickſhire*, leaving *Birmingham* a little to the Left. Then marches near *Boſworth* in *Leiceſterſhire*, and ſo on, near *Nottingham*; then near *Lincoln* and *Grimſby* in *Lincolnſhire*, and ſo over the *Humber*, quitting the *Engliſh* Coaſt near *Patrington*, a few Miles to the Weſtward of the *Spurn-Head*.

The Eaſtern Edge enters *France*, paſſes over the Iſle of *Rhee* to *Poictu*, leaving *Rochelle* to the Left, and traverſing *Anjou*, *Maines*, and *Normandy*, enters *Picardy*, betwixt *Havre* and *Rouen*, (which is its neareſt Approach to the City of *Paris*,) paſſing near *Dieppe*, *Boulogne*, and *Calais*, leaving *Dunkirk*, *Newport*, and *Oſtend*, to the Right, croſſes the *Channel* to the *Hague*, in its Way over *Holland*, *&c.*

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* The central Shade makes an Angle of $36\frac{1}{2}$ or 37 Degrees eaſterly with the Meridian, over *England*.

Of the Great TOTAL ECLIPSE *in* 1715.

By OBSERVATION *at* LONDON, *apparent Time.*

		d	h	m	s
Greateſt Obſcuration	*April*	22	9	10	45
Duration of total Darkneſs				3	23

		°	′	″
Sun's Altitude then		40	46	0
——— under the Center of the Shade		40	0	0
Diſtance of *London* from the Center of the Shade		0	46	0
Sun's *Azimuth* then, in an Angle with the Meridian		59	0	0
Angle of the *Path* of the Shadow, with a Parallel		53	0	0
It croſſed the Meridian of *London*, in Lat.	N.	52	30	0
Its *neareſt Approach* to *London*		0	47	0

COMPUTATION *according to Dr.* Halley's Tables.

Horizontal Parallax of the Moon from the Sun	60	38	0
Moon's Diameter	33	27	0
Moon's Altitude	40	33	47
Obſerved Diameter of the Sun	31	41	0
Whence the computed *true* Latitude of the Moon	44	55	0
Parallax in Lat. of the Moon from the Sun	44	9	0
Thence viſ. Latitude of the Moon	0	46	0
Viſ. *horary* Motion of the Moon from the Sun	28	38	0
Duration of total Darkneſs 3 m 43 s			
Diſtance of the Center of the Shade from *London*	0	43	0
Differing from Obſervation only	0	3	0

Of the Annular *Eclipſe of the* SUN, 1737.

Obſerved at Edinburgh, *by Ld.* Moreton, *Mr.* Short, *&c.*

Duration of the *annular* Appearance — — — 0 h 5 m 48 s

The *Annulus* appeared ſomewhat larger at the lower than upper Limb. By ſeveral Obſervations made *near* the *Track* of the *Shade* on the Weſtern and Eaſtern Coaſts of *Scotland*, it was determined that the Center of the *Shade* entered that Kingdom at *Croſby*, near *Irwin*, and left it at *Montroſe*.

The Path of the *Shade*, therefore, left *Edinburgh* to the Southward, about 22 Miles. This Truth is confirmed by the Southern *Limit* obſerved to paſs over *Framlington*, near *Morpeth*, in *Northumberland*.

According to COMPUTATION.

Viſible Latitude of the Moon was 5″, or 5 *geographical* Miles to the Northward	0° 0′ 5″
Different to the obſerved Diſtance	0 0 16
Duration of the *annular* Appearances in Time	7 m
Central *Shade* paſſed North of *Edinburgh*	0 0 22

(inſtead of 47 by *Obſervation*) which the *Track* of the *Shade* acroſs the Kingdom does not admit of.

In this, and the *annular Eclipſe* 1748, Mention being made of a *duſky Light*, where the Eclipſe was not annular, extending from one *Cuſp* of the Moon's Horns to the other, it ſeems to prove that the Moon has an *Atmoſphere* ſurrounding her dark Body, by which the *Annulus* did not appear perfectly formed, before that was wholly *immerged* within the *Sun*, and the Duration was apparently ſhortened.

The Moon's *Parallax* was obſerved	53′ 54″
——— Latitude	34. 2

Of the ANNULAR ECLIPSE *of the* SUN, 1748.

OBSERVED at *Aberdeen* in *Scotland* by Mr. *Stewart*, Mathematical Profeſſor.

Duration of *Annular* Appearance — — — — 5′ 48″.

The ſame Eclipſe was alſo obſerved at *Dundee* where the *Annulus* appear'd narrower on the *Moon's* Upper, than Lower Limb.

Therefore, the Center of the *Moon's* Shade paſs'd North-ward of *Dundee*.

This Eclipſe was obſerved at *Elgin*, by Mr. *Irwin*, who remarks that the *South-weſt* Limb appear'd narrower than its Oppoſite Limb; and therefore the *Shade* paſs'd Southward of *Elgin*, pretty nearly between both Places.

Latitude of *Dundee*	56° 25′
——— *Aberdeen*	57 11
——— *Elgin*	57 34

Conſequently *Aberdeen* was nearly the Courſe of the Shade's Paſſage.

ACCORDING *to* COMPUTATION.

Horizontal Parallax Moon from the Sun	53′ 21″
Moon's true Latitude N.	29 20
——— Viſible Latitude N.	0 15
Duration of the *Annulus*	5m 42s
Differing from Obſervation only	0 6

But it is to be ſuſpected that the true *Duration* is ſhortened again by the ſame *Cauſe*, or it has not been *accurately* meaſured.

At *Dundee*, and *Elgin*, it certainly was not truly meaſured; for though apparently of the ſame Diſtance from the Center, at the former *Place*, it was obſerved to continue 6 m. 54s; and at *Elgin* only 4 m. 30 s.

It is to be hoped that our more *accurate* Obſervers, in *England*, will give more Satisfaction in obſerving the Sun's *Annular* Eclipſe for 1764.

And it may be *remarked*, that, by comparing theſe *Obſervations* and *Computations* together, that there is no Reaſon to apprehend Incorrectneſs of Computation from *Halley's Parallaxes*, and *Latitude* of the Moon, in the enſuing *Annular* Eclipſe of the Sun. The greateſt Difference between the *Paſſage* of the *Lunar Shade*, in all the three aforementioned Eclipſes, by *Halley's* Numbers, is but about 16 *geographical* Miles. And conſidering that the Errors of the *Moon's* Latitude, as well as of her *Parallax*, are to be taken into Account, and that the *Longitudes* and *Latitudes* of Places are not very accurately determined, the Errors of *Latitude* and *Parallax* may not, very likely, compenſate for each other, in all theſe Eclipſes: Yet the Agreement of the Obſervation with the Computation is wonderful, and raiſes our Admiration of *Halley's* great Judgment in determining his Numbers.

☞ The *Tranſverſe* of the *oval Shade* makes an Angle with the *Courſe* of it's Paſſage, near *Greenwich*, of 65° 36′; or an Angle with it's *general* Courſe over *England*, about 66 Degrees and a Half.

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